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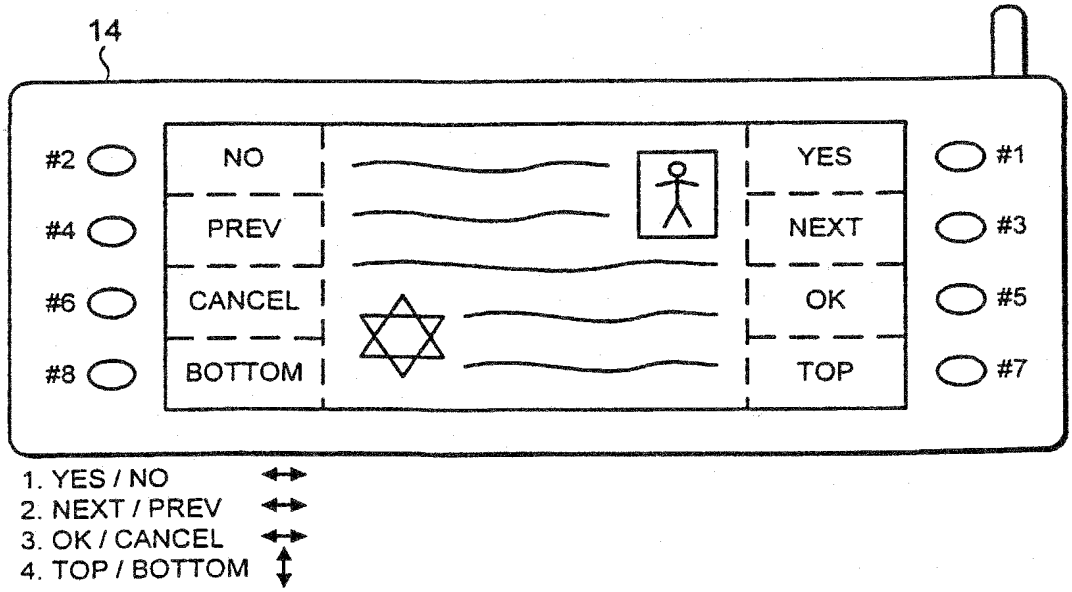
(54) Title: ALLOCATION OF LABELS TO ASSOCIATED USER INPUT ELEMENTS



(57) Abstract: Soft keys (6, 8) are allocated desired functions and associated labels (10, 12) in accordance with predetermined rules and in dependence upon variable mapping control data in order to match the display data to the display capabilities and available soft keys of a particular device. Candidates for allocation to soft keys can be given relative priorities for this allocation and preferred relative locations can be specified for individual or pairs of soft keys. User options can modify the way the soft keys are allocated to take account of left handed or right handed user of a device.

WO 02/13001 A2

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ALLOCATION OF LABELS TO ASSOCIATED USER INPUT ELEMENTS

This invention relates to the allocation of labels to associated user input elements.

It is known to provide devices having a display with one or more user input elements having a function that varies dependent upon the state of the device and that is indicated by a corresponding label on a display of the device. As an example, mobile telephones often include several keys above which a label on the display indicates a particular function provided by that key given the current state of the mobile telephone.

There is a desire to provide access to source data, such as internet webpages (or other mark-up language document), via a wide diversity of device types. Examples of such device types are mobile telephones and personal organisers. Compared with the personal computers for which internet source material is usually developed, a characteristic of many of the new types of device with which it is desired to access this existing source material is that these devices have far more limited user input mechanisms, i.e. limited mouse functionality or keyboard functionality.

It is strongly desirable to be able to maximise the user input capabilities of a particular device accessing internet source material, such as by making full use of any soft keys available. However, a problem exists in that the soft key location, number and configuration of devices varies greatly. Accordingly, the burden of modifying the internet source data to produce specific versions adapted to each type of device is considerable.

Viewed from one aspect the present invention provides a method of generating display data for driving a display from source data, said display data including one or more labels associated with respective user input elements, said one or more labels being changeable to reflect changeable functions associated with respective user input elements, said method comprising the steps of:

identifying within said source data one or more input label tags corresponding to one or more labels and associated user input elements;

mapping identified input label tags to available user input elements of said display device in accordance with predetermined rules and in dependence variable mapping control data; and

generating display data including labels associated with respective user input elements in accordance with said mapping.

The invention recognises that it is possible to generate display data that uses the soft key capabilities of a device without having to write special source data if instead predetermined rules are used to map the input label tags to appropriate user input elements in accordance with variable mapping control data. The mapping control data can specify the particular target device. Alternatively, the mapping data can specify different user options on a single target device type, such as options modifying the allocations of soft keys to suit left handed or right handed use. It will be appreciated that the labels to be associated with the user input elements could be text labels, icons, graphics or other entities for identifying the input elements to a user.

It will be appreciated that the user input elements could be physical keys or areas upon a touch sensitive display or other manually operable user inputs.

Whilst the predetermined rules and the mapping control data could take many forms, it is preferred that the input label tags should have associated priorities controlling the order in which they are allocated to the available soft keys.

Further refinement in the way in which the soft keys are allocated is achieved in preferred embodiments in which the input label tags have associated preferred relative location data indicating one or a sequence of preferred locations of the soft key that should be allocated to that input label tag. In this way, a key and its label may be allocated to the most logical position e.g. a top button can be placed at the top of the display and a bottom button placed at the bottom of a display.

A common circumstance in many applications is that soft keys and labels are grouped into pairs. The relative location of the elements of these pairs is important for an intuitive use of the soft keys by a user. Accordingly, in preferred embodiments the predetermined rules seek to allocate the relative positions of the elements within a grouped pair in accordance with a sequence of preferences that tries to place the elements in the most logical and easy to operate positions for a particular user.

Whilst the present invention may be used upon a wide variety of source data material (such as any mark-up language document), it is particularly useful in the context of displaying and interacting with internet webpages. Furthermore, the

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invention is particularly useful in the context of portable internet access devices such as wireless telephones.

Viewed from another aspect the present invention provides an apparatus for generating display data for driving a display from source data, said display data including one or more labels associated with respective user input elements, said one or more labels being changeable to reflect changeable functions associated with respective user input elements, said method comprising:

identifying logic operable to identify within said source data one or more input label tags corresponding to one or more labels and associated user input elements;

mapping logic operable to map identified input label tags to available user input elements of said display device in accordance with predetermined rules and in dependence variable mapping control data; and

generating logic operable to generate display data including labels associated with respective user input elements in accordance with said mapping.

The invention also provides a computer program media bearing a computer program for controlling generation of display data in accordance with the above described techniques.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 illustrates a mobile telephone incorporating soft keys;

Figures 2A, 2B and 2C indicate a portable internet access device displaying labels for a plurality of soft keys in accordance with differing mapping control data;

Figures 3 and 4 illustrate a personal digital assistant displaying a webpage and respectively configured for a right handed user and a left handed user;

Figure 5 is a simplified flow diagram illustrating the method of allocating labels to soft keys;

Figure 6 illustrates the sequence of preferred relative locations of elements within pairs of elements for two different types of pairs of elements; and

Figure 7 illustrates a data processing apparatus for implementing the techniques described in relation to Figures 1 to 6.

Figure 1 shows a mobile telephone 2 including a display 4. The mobile telephone 2 includes a first soft key 6 and a second soft key 8. The first soft key 6 has an associated label 10 and the second soft key 8 has an associated label 12. In this

example the label is text, but it will be understood that the label could have a variety of other forms such as an icon, a graphic, etc.

The mobile telephone 2 is one that provides mobile internet access. Prior to display, the source data forming the internet webpage is searched for tags identifying soft keys and their labels. In this instance the number of soft keys available is very limited and so only the two highest priority soft keys can be allocated. In the example shown and for the particular webpage (or other mark-up language document) being displayed the highest priority soft keys correspond to the functions "Yes" and "No". For a right handed user who will typically operate the soft keys with their right thumb, it is most intuitive that the first key 6 should be allocated the function of "Yes" and the second key 8 should be allocated the function "No". For a left handed user who would operate the soft keys 6, 8 with their left thumb, then the labels 10, 12 may be reversed.

It will be appreciated that a different mobile telephone may have more available soft keys and so a greater number of labels may be displayed associated with the soft keys. Also, for a given mobile telephone, the allocation of the soft keys will vary between pages. Accordingly, on the page illustrated the highest priority labels correspond to "Yes" and "No", whereas on a different webpage whilst the "Yes" and "No" functions may be present, these may not be the highest priority items and accordingly will be superseded by other soft keys with their associated labels.

Figures 2A, 2B and 2C all illustrate a mobile internet access device 14 having eight soft keys with associated labels. In these examples the user options have been set to specify a right handed user. Accordingly, the interface is made most intuitive and usable if the highest priority soft keys and labels are associated with the top right hand soft keys with priority decreasing upon moving downwards and leftwards. For a left handed user, then highest priority soft keys would be allocated in the top left hand corner with the priority decreasing upon moving downwards and rightwards.

In Figure 2A the input label tags within the source data indicate that the soft key pairs should be allocated in the priority order shown in the list of Figure 2A. The highest priority pair of soft keys is the Yes/No pair. This pair has associated relative location data indicating that it is most intuitive for a user for the Yes key to be placed horizontally to the right of the No key. Accordingly, these soft keys are respectively allocated to the top right hand key and the top left hand key. Similarly, the following

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pair of soft keys in the priority order are the Next/Previous soft keys that are also specified as preferably being horizontally relatively located with the Next key being allocated to the second highest key on the right hand side and the Previous key being allocated to the second highest key on the left hand side. The same is true of the OK and Cancel keys that are accordingly allocated to the third highest soft key on the right hand side and the third highest soft key on the left hand side. In the case of the Top and Bottom soft keys, these are fourth in the priority list. Accordingly, by the time that these soft keys are to be allocated, there are no longer available any vertically adjacent pair of soft keys to which they may be allocated. Accordingly, the next most preferably relative location of these soft keys is chosen that is one with the Top key horizontally to the right of the Bottom key.

Figure 2B illustrates display of the same webpage and soft keys except that the priority ordering has been altered. In this example the highest priority soft key pair is the Top key and the Bottom key and accordingly these are allocated to the right hand upper most two soft keys. The next soft key pair is the Yes and No soft keys. The top preference for the relative location of these keys is horizontally adjacent one another with the Yes key to the right of the No key for a right handed user. Accordingly, these are allocated to the third highest soft key on the right hand side and the third highest soft key on the left hand side respectively. The next highest priority soft key pair is the Next key and the Previous key. The only available horizontally pair of unallocated soft keys is not the lowermost pair of soft keys. Accordingly, the Next key is allocated to the lowermost right hand soft key and the Previous key is allocated to the lower most left hand soft key. The one remaining soft key pair to be allocated is the OK key and the Cancel key. Whilst the first preference for these keys is that the OK key should be to the right of the Cancel key, this is no longer a possibility and accordingly the second preference of the OK key being above the Cancel key is adopted.

Figure 2C illustrates a further example in which the first and second priority soft key pairs are allocated their preferred relative horizontal locations and the third highest priority soft key pair is allocated its preferred location of vertically adjacent soft keys. The final soft key pair of the Yes key and the No key has a first preference relative location of the Yes key being to the right of the No key, but this is no longer

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available and so the second preference of the Yes key being vertically above the No key is adopted.

Figures 3 and 4 illustrate a personal digital assistant 16 displaying the same internet webpage but in accordance with respective configurations for a right handed user and a left handed user. In this example there are two physical soft keys 18, 20 and four touch sensitive screen areas 22, 24, 26 and 28 that are allocated to soft keys. Further input label tags within the source data that are found once all of the available soft keys are allocated are in this case allocated to hypertext links 30.

All of the pairs of soft keys Yes/No OK/Cancel and Next/Previous that are allocated soft keys are ones in which the first order preference for a right handed user is with the first element horizontally to the right of the second element. When the user option data specifies a left handed user, then this is reversed with the first choice relative location being with the first element to the left of the second element. In the case of the Next and Previous soft keys, these are not allocated horizontally adjacent soft keys in either example and the vertical relative positions of these two soft keys are accordingly unchanged by the right hand and left hand user option.

Figure 5 illustrates a flow diagram of the technique of the present invention. At step 32 a page of source data representing an internet webpage is fetched. This source data contains input label text specifying soft keys and soft key pairs to be allocated together with their respective labels, relative priorities and sequence of preferred relative positions.

At step 34, details are fetched of the target device upon which the source data is to be displayed. At step 36, user preferences, such as right handedness or left handedness are fetched.

At step 38, the source page is parsed to identify the input label tags within the page.

At step 40 the number and ordering of the desired soft keys identified at step 38 is established.

At step 42 the soft keys are allocated to the available physical keys or touch screen areas of the target device in accordance with their relative priority ordering and the relative position preferences associated with each input label tag.

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At step 44 any remaining tags that have not been allocated to physical keys or touch screen areas are allocated to hypertext links that are inserted into the webpage to be displayed.

Figure 6 illustrates the sequence of relative position preferences for soft key pairs. In the upper example the soft key pair is one in which the highest preference is for one of the keys to be displayed vertically above the other key. The next preference is for the first key to be displayed to the right of the second key, the third preference is for the first key to be displayed above and to the right of the second key and the final preference is for the first key to be displayed above and to the left of the second key. If none of these preferences turns out to be available, then the keys can simply be allocated in turn to whatever soft keys, if any, remain.

The lower example of Figure 6 illustrates a soft key pairing which the highest preference is for the first key to be displayed horizontally to the right of the second key. The second preference is for the first key to be displayed vertically above the second key, the third preference is for the first key to be displayed above and to the right of the second key and the fourth preference is for the first key to be displayed below and to the right of the second key.

Both of the examples illustrated in Figure 6 are for a right handed user. In the case of a left handed user, the predetermined rule is modified such that the right hand positions and left hand positions in both of these examples, where applicable, are reversed.

Figure 7 illustrates a data processing apparatus, in this case the elements of a mobile telephone, for performing the above described techniques. The telephone includes a central processing unit 46, a read only memory 48, a random access memory 50, a wireless interface unit 52, a display driver 54 with associated display 56 and a user input unit 58 with associated physical soft keys 60 and touch sensitive areas 62.

In operation the central processing unit 46 executes a computer program stored within the read only memory 48 using the random access memory 50 as its working memory. Internet webpages received via the wireless interface unit 52 are processed to adapt them to the display capabilities and user option preferences of the particular device. This processing allocates soft keys identified by input label tags within the source data to available physical keys 60 and touch sensitive areas 62.

It will be appreciated that in alternative embodiments, the processing to adapt the source data for a particular display 56 may instead be performed at the source server or a proxy server rather than at the client device. Accordingly, a mobile telephone could log into a proxy server and identify itself as a particular type of device. The user identifier and password could be used to access particular user preferences, such as indicating whether the user had specified right handed or left handed use. The proxy server via which the device had connected could then act to receive internet webpages from any other remote internet webpage source and process these in accordance with the soft key allocation techniques described above prior to passing the now modified display data out to the client device in a form matched to the capabilities of that client device and the specified user preferences of the user of that client device.

Whilst the example of Figure 7 indicates that the computer program for controlling the system in accordance with the present technique is stored in the read only memory 48, it will be appreciated that this computer program could be stored by many different media or indeed dynamically downloaded to the device via the medium of wireless communication.

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CLAIMS

1. A method of generating display data for driving a display from source data, said display data including one or more labels associated with respective user input elements, said one or more labels being changeable to reflect changeable functions associated with respective user input elements, said method comprising the steps of:

identifying within said source data one or more input label tags corresponding to one or more labels and associated user input elements;

mapping identified input label tags to available user input elements of said display device in accordance with predetermined rules and in dependence variable mapping control data; and

generating display data including labels associated with respective user input elements in accordance with said mapping.

2. A method as claimed in claim 1, wherein said user input element is a key having a variable function indicated by an associated label upon said display.

3. A method as claimed in claim 1, wherein said display is a touch sensitive display and said user input element is an area of said touch sensitive display having a variable function indicated by and associated label upon said touch sensitive display.

4. A method as claimed in any one of claims 1, 2 and 3, wherein said display is part of one of a plurality of different types of device and said variable mapping control data includes device specifying data indicating upon which type of device said display data is to be displayed.

5. A method as claimed in claim 4, wherein said different types of device have differing user input elements.

6. A method as claimed in any one of claims 4 and 5, wherein said different types of device have different display capabilities.

7. A method as claimed in any one of the preceding claims, wherein said variable mapping control data includes user specified option data.

8. A method as claimed in claim 7, wherein said user specified option data indicates whether display data should be adapted for a right handed user or a left handed user.

9. A method as claimed in any one of the preceding claims, wherein said one or more input label tags each include priority data indicating a relative display priority.

10. A method as claimed in claim 9, wherein one of said predetermined rules maps said input label tags to available user input elements in accordance with said priority data.

11. A method as claimed in claim in any one of the preceding claims, wherein said one or more input label tags each include preferred relative display location data indicating a preferred relative display location of an associated user input element to be mapped to said input label tag.

12. A method as claimed in claim 11, wherein one of said predetermined rules maps said input label tags to available user input elements in accordance with said preferred relative display location data.

13. A method as claimed in claims 11 and 12, wherein said preferred relative display location data indicates an ordered sequence of preferred relative display locations and said one of said predetermined rules maps an input label tag to a most preferred available user input element within said ordered sequence.

14. A method as claimed in claims 9 and 13, wherein relative display location preferences of an input label tag having a higher relative priority are satisfied from those available user input elements before those of an input label tag having a lower relative priority.

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15. A method as claimed in any one of the preceding claims, wherein labels and associated user input elements are grouped in pairs.

16. A method as claimed in claims 11 and 15, wherein said preferred relative display location indicates a preferred relative location of a first element of a pair with respect to a second element of a pair.

17. A method as claimed in claim 16, wherein a preferred relative location of said first element is above said second element on said display.

18. A method as claimed in claims 8, 13 and 17, wherein at least a first portion of said ordered sequence of preferred relative locations for a right handed user is:

said first element substantially directly above said second element;
said first element substantially directly right of said second element;
said first element above and to the right of said second element; and
said first element above and to the left of said second element.

19. A method as claimed in claims 8, 13 and 17, wherein at least a first portion of said ordered sequence of preferred relative locations for a left handed user is:

said first element substantially directly above said second element;
said first element substantially directly left of said second element;
said first element above and to the left of said second element; and
said first element above and to the right of said second element.

20. A method as claimed in claim 14, wherein a preferred relative location of a first element is substantially to the right of said second element on said display.

21. A method as claimed in claims 8, 13 and 20, wherein at least a first portion of said ordered sequence of preferred relative locations for a right handed user is:

said first element substantially directly right said second element;
said first element substantially directly above of said second element;
said first element above and to the right of said second element; and
said first element below and to the right of said second element.

22. A method as claimed in claims 8, 13 and 20, wherein at least a first portion of said ordered sequence of preferred relative locations for a left handed user is:
said first element substantially directly left said second element;
said first element substantially directly above of said second element;
said first element above and to the left of said second element; and
said first element below and to the left of said second element.

23. A method as claimed in any one of the preceding claims, wherein said source data is a mark up language data file.

24. A method as claimed in any one of the preceding claims, wherein said display data represents an internet webpage.

25. A method as claimed in claim 24, wherein any input data tags for which user input elements are not available are associated with hypertext links within said internet webpage.

26. A method as claimed in claim 4, wherein said plurality of types of device comprise a plurality of types of portable internet access devices.

27. A method as claimed in claim 26, wherein said plurality of types of portable internet access devices comprise a plurality of types wireless telephones having internet access capability.

28. An apparatus for generating display data for driving a display from source data, said display data including one or more labels associated with respective user input elements, said one or more labels being changeable to reflect changeable functions associated with respective user input elements, said method comprising:
identifying logic operable to identify within said source data one or more input label tags corresponding to one or more labels and associated user input elements;

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mapping logic operable to map identified input label tags to available user input elements of said display device in accordance with predetermined rules and in dependence variable mapping control data; and

generating logic operable to generate display data including labels associated with respective user input elements in accordance with said mapping.

29. A computer program media bearing a computer program for controlling a computer to perform a method as claimed in any of claims 1 to 27.

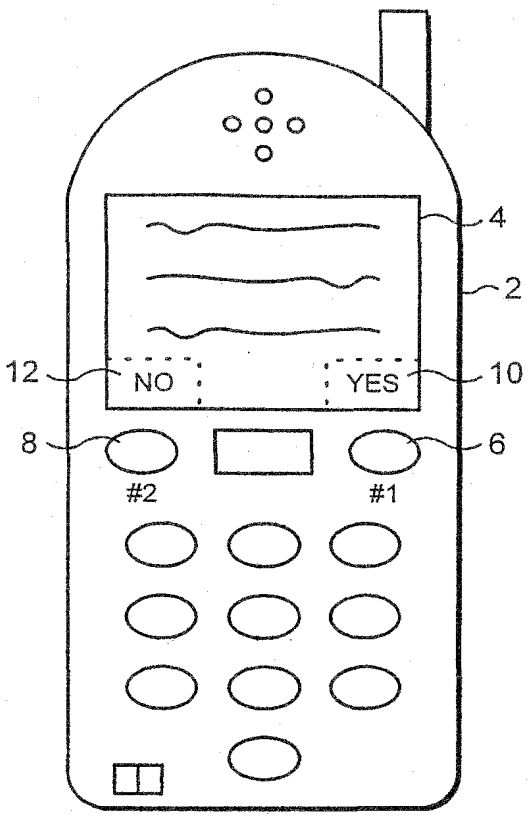

FIG. 1

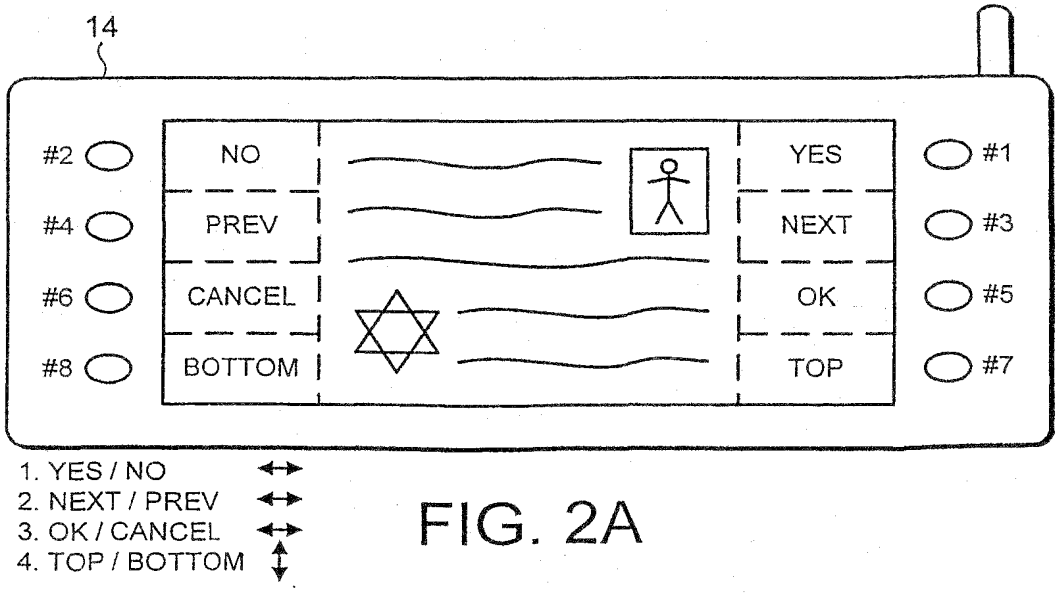

FIG. 2A

BNSDOCID: <WO_____0213001A2_I_>

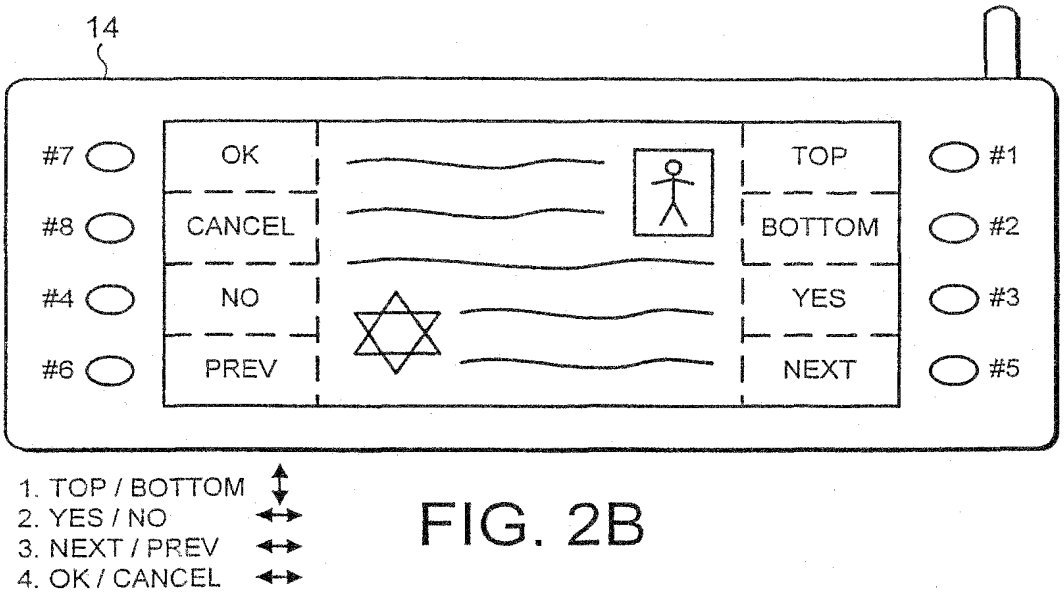
14
#7
#8
#4
#6
OK
CANCEL
NO
PREV
TOP
BOTTOM
YES
NEXT
#1
#2
#3
#5
1. TOP / BOTTOM
2. YES / NO
3. NEXT / PREV
4. OK / CANCEL

FIG. 2B

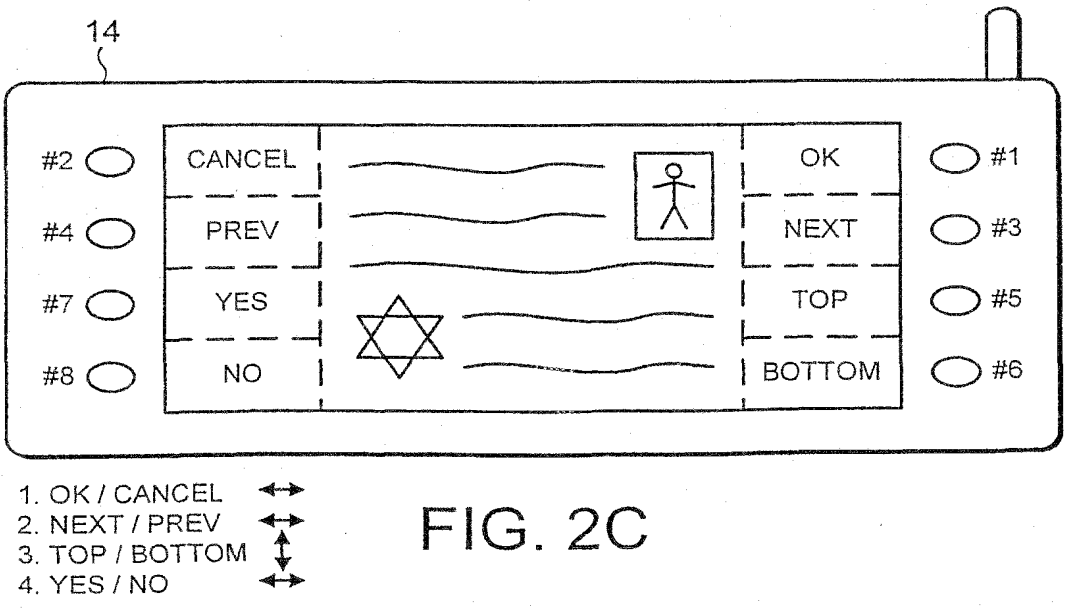
14
#2
#4
#7
#8
CANCEL
PREV
YES
NO
OK
NEXT
TOP
BOTTOM
#1
#3
#5
#6
1. OK / CANCEL
2. NEXT / PREV
3. TOP / BOTTOM
4. YES / NO

FIG. 2C

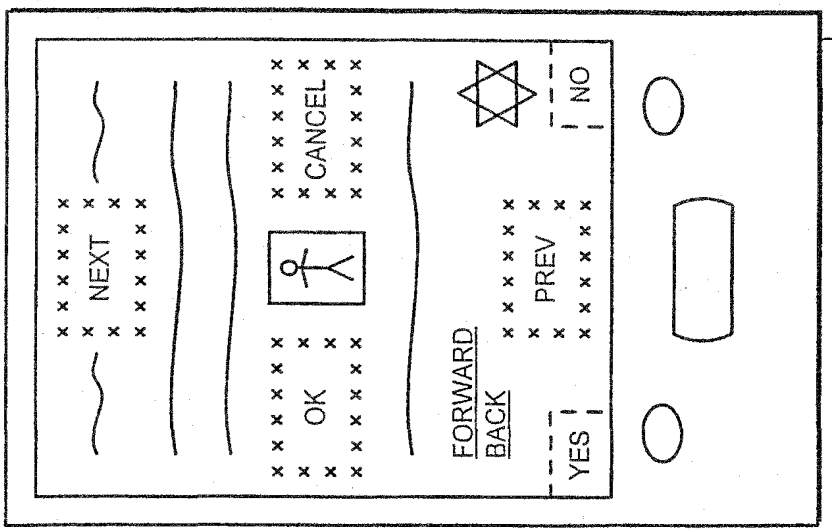

FIG. 4

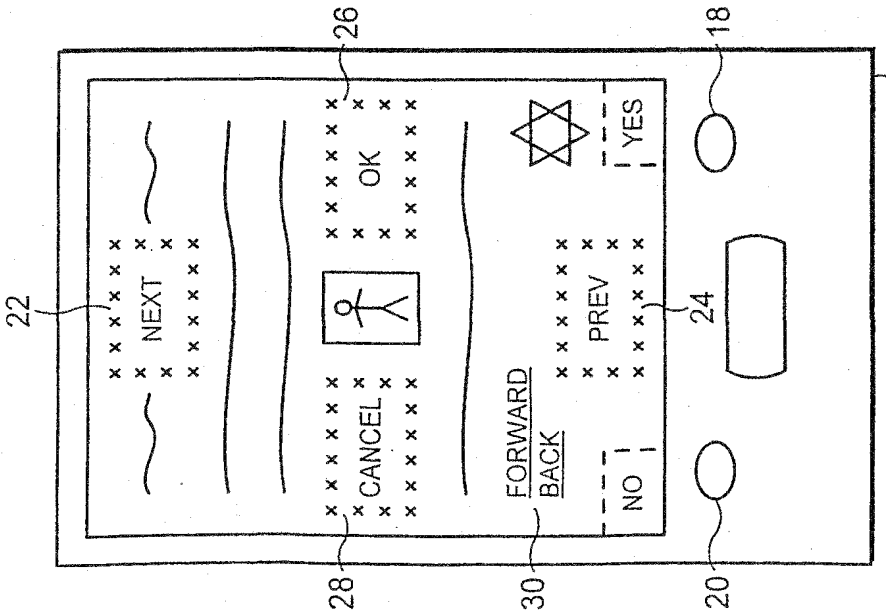

FIG. 3

BNSDOCID: <WO_____0213001A2_I_>

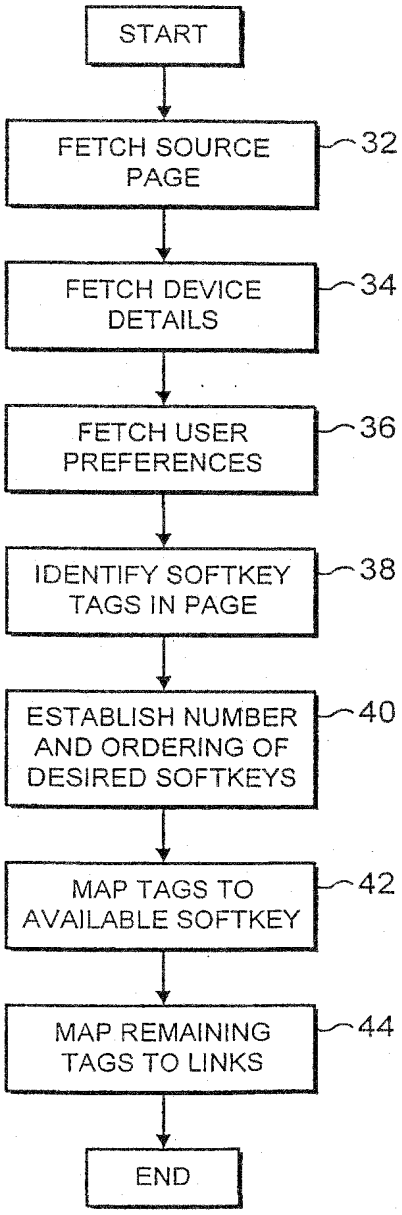
START
FETCH SOURCE PAGE
32
FETCH DEVICE DETAILS
34
FETCH USER PREFERENCES
36
IDENTIFY SOFTKEY TAGS IN PAGE
38
ESTABLISH NUMBER AND ORDERING OF DESIRED SOFTKEYS
40
MAP TAGS TO AVAILABLE SOFTKEY
42
MAP REMAINING TAGS TO LINKS
44
END

FIG. 5

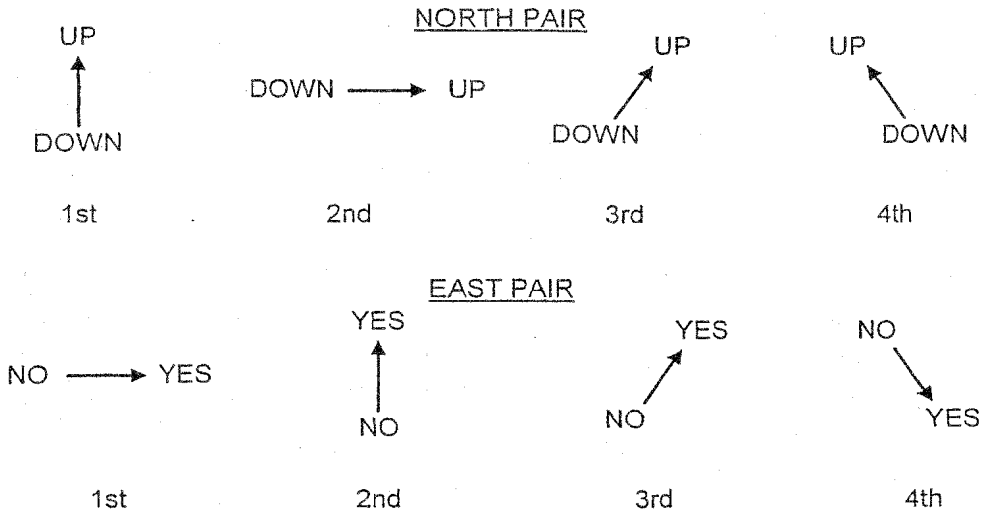

FIG. 6

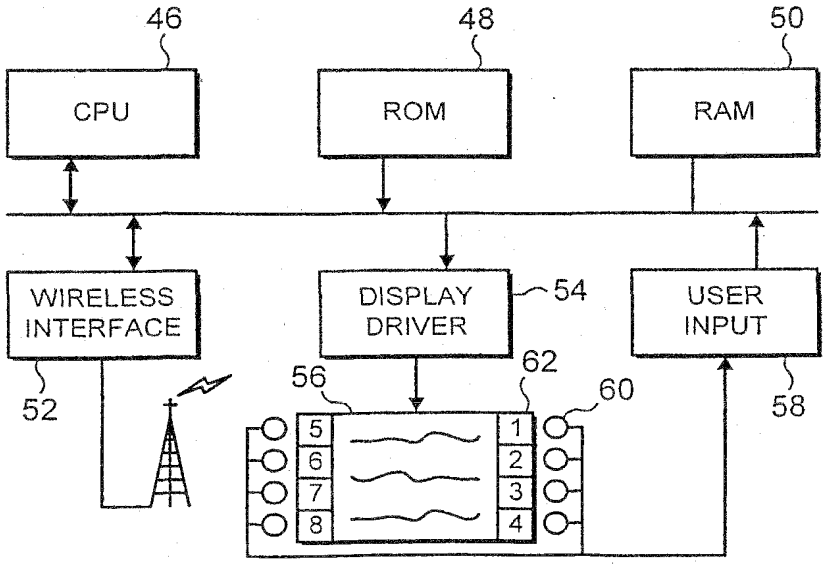

FIG. 7

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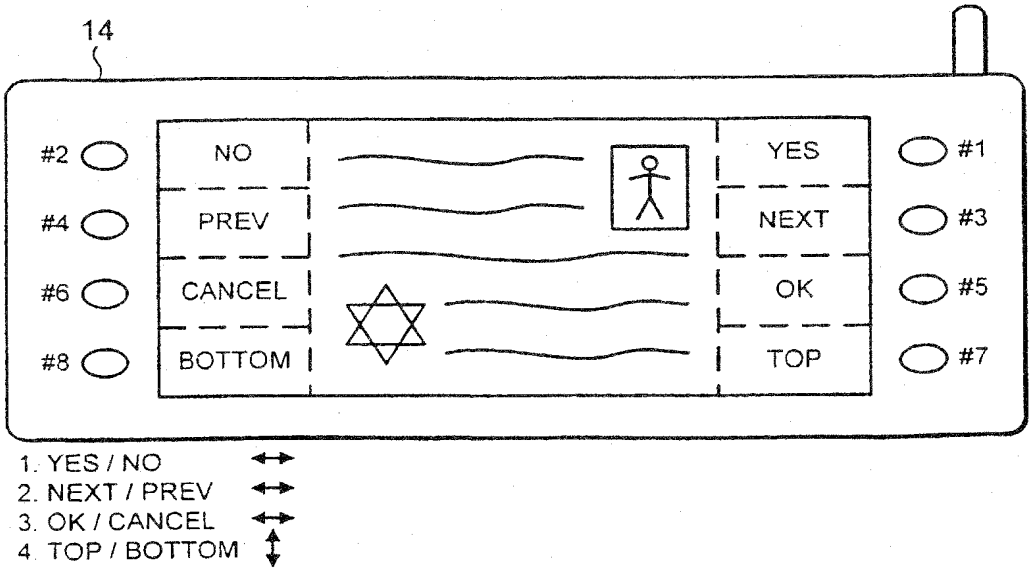
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ALLOCATION OF LABELS TO ASSOCIATED USER INPUT ELEMENTS



(57) Abstract: Soft keys (6, 8) are allocated desired functions and associated labels (10, 12) in accordance with predetermined rules and in dependence upon variable mapping control data in order to match the display data to the display capabilities and available soft keys of a particular device. Candidates for allocation to soft keys can be given relative priorities for this allocation and preferred relative locations can be specified for individual or pairs of soft keys. User options can modify the way the soft keys are allocated to take account of left handed or right handed user of a device.

WO 02/13001 A3

BNSDOCID: <WO_____0213001A3_I_>

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/02889

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/023 G06F3/033 H04M1/247

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
PAJ, EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 004 957 A (MITSUBISHI ELECTRIC CORP) 31 May 2000 (2000-05-31) paragraph '0074! - paragraph '0092!; figures 10-15	1-7,23, 24,26-29
X	EP 0 872 994 A (ASCOM BUSINESS SYSTEMS AG) 21 October 1998 (1998-10-21) abstract column 5, paragraph 4 figure 2	1,3,28, 29
A	"CUSTOMIZABLE SOFTWARE KEYBOARD" IBM TECHNICAL DISCLOSURE BULLETIN, IBM CORP. NEW YORK, US, vol. 41, no. 1, 1998, page 277 XP000772106 ISSN: 0018-8689 the whole document	1,3,28, 29

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 April 2002	22/04/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Ciarelli, N

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int tional Application No
PCT/GB 01/02889

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 1004957 A1	31-05-2000
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